California Air Resources Board Agricultural Advisory Committee for Air Quality

Emission Inventory Subcommittee

Modesto, California

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How are Emission Inventories Calculated?

- Develop activity
  - (population, horsepower, load, etc)
- Assign an emission factor
  - (lbs of ROG/hr)

Emissions = Activity x Emission Factor

- Assign a speciation profile (how much of the emitted gas produces ozone)

Categories of Agricultural Emissions

- Farm equipment
- Processing and handling facilities
- Irrigation pump engines
- Livestock wastes
- Pesticides
- Agricultural burning
- Field and orchard operations

How are Emission Inventories Projected into the Future?

- Growth surrogates
  - Historical trends are often used to select best growth surrogates
  - Pechan and Associates, under contract to ARB, developed surrogates based on a socioeconomic model for most stationary and areawide sources
  - Other methods used as appropriate

How are Emission Inventories Projected into the Future?

(continued)

- Apply control factors, if applicable
  - Adopted rules and regulations

Future Emissions = Base Year Emissions x Growth x Control

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Pesticide Inventory

- Interagency coordination
- Complex category
  - Variety of products
  - Number of independent variables
  - Significant resources dedicated
- We recognize the need for refinements

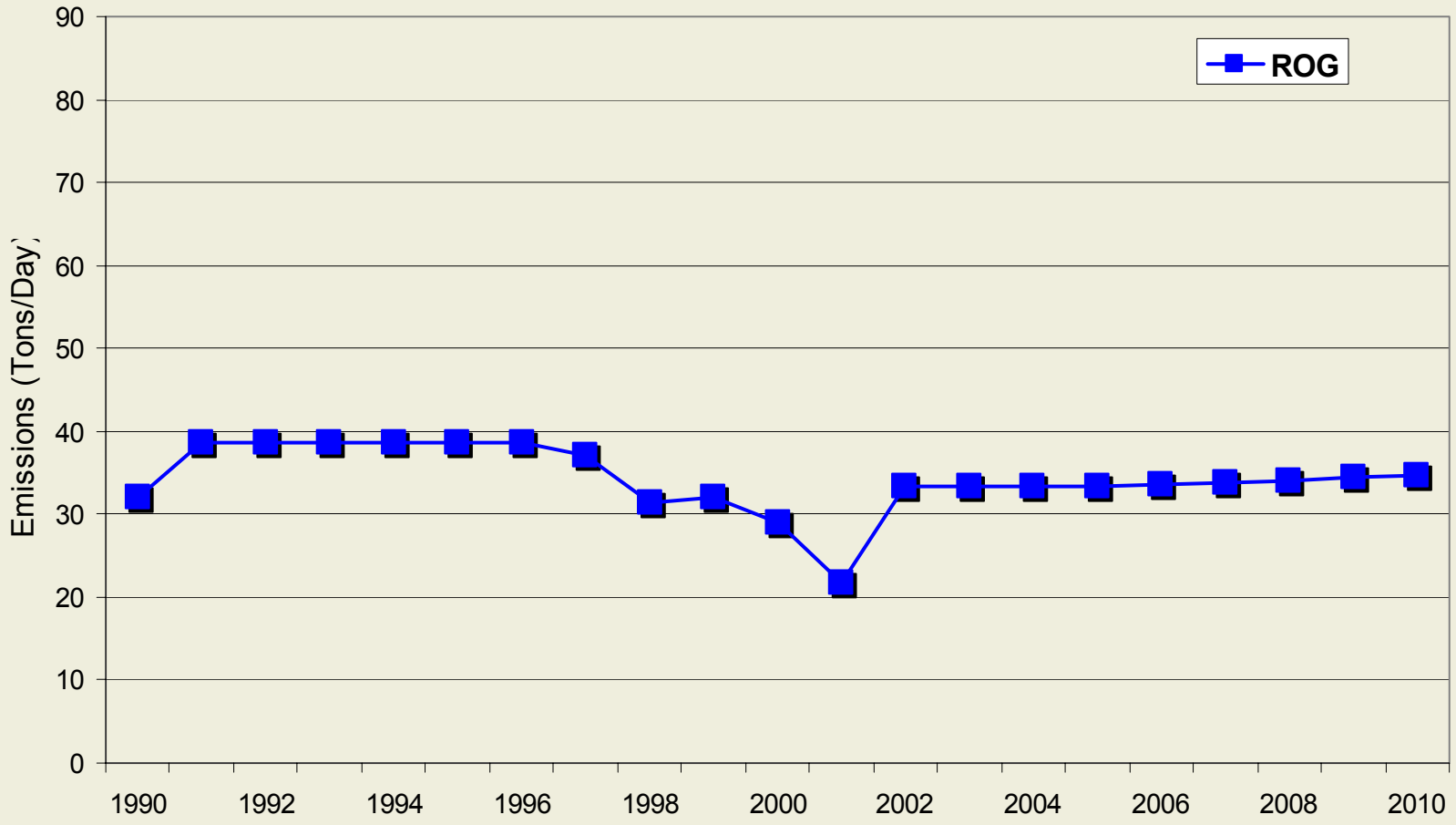
Pesticides (ROG)

Base Year Emissions

= *Usage x Emission Potentials*

- Pesticide usage
  - Pesticides applications and usage data are from daily and county-specific Pesticide Use Reports filed by the growers
- Pesticide emission potentials
  - Developed by DPR based on thermogravimetric analysis
- Single statewide speciation profile

SJV Pesticide ROG Emissions



Pesticides (ROG)

- **Growth Trend**
  - based on forecasted dollars of farm output
- **Control**
  - methyl bromide phase-out
- **Future Improvements**
  - Develop crop-specific growth surrogates by projected acreage
  - Develop regional and ozone season-specific speciation profiles
  - develop a GIS-based pesticide emissions inventory

Farm Equipment (ROG & NO_x)

- **Activity Data**
  - Based on data taken from Power Systems Research (PSR) and the USDA. These sources estimate the total population by farm equipment, the average horse-power, the hours of operation, and the load factor.
- **Emission Factors**
  - Based on engine tests. Population and activity weighted average emission rates for 1999 calendar year in gm/hp-hr are: TOG 1.23, CO 4.17, NOx 9.04 and PM 0.58

SJV Farm Equipment

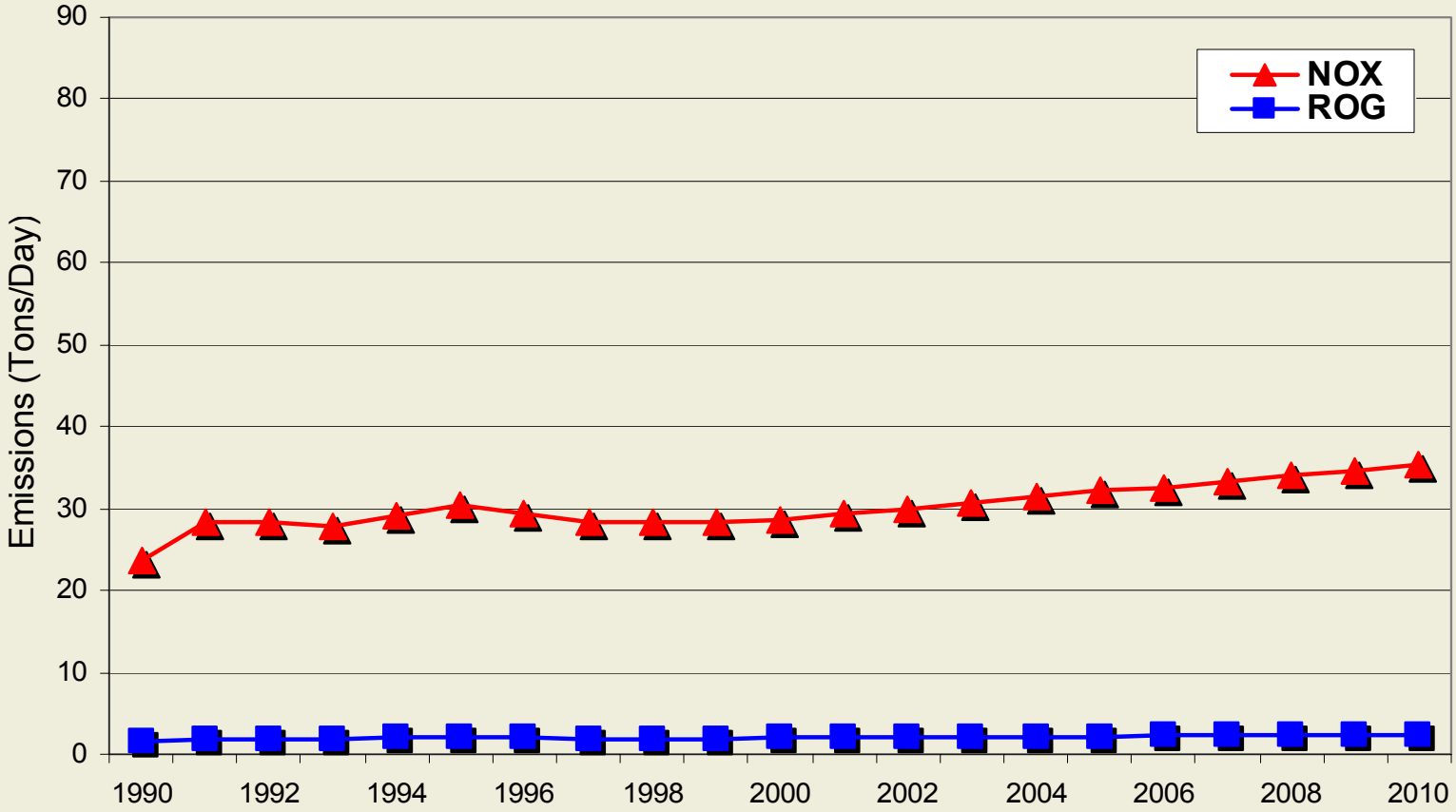
Farm Equipment (ROG & NOx)

- **Growth**
  - Currently assume a 0.5% decline in emissions each year for this category.
- **Control**
  - The emission factors for farm equipment reflect USEPA and ARB's adopted regulations for off-road equipment.
- **Future Improvements**
  - Input from various stakeholders continues to improve the emission estimates for this category.

Agricultural Irrigation Pumps (ROG & NO_x)

- **Activity Data**
  - Based on a survey by STI performed in 1995 for the SJV district. The survey results estimated the total population of fuel burning engines, the horse-power of each engine, the time of operation and the load factor.
  - We recognize that more work needs to be done to update these activity data estimates.
- **Emission Factors**
  - Based on engine manufacturer data supplied to STI.
  - This part of the survey data is generally accepted by ARB and the SJV district as being reliable.

SJV Agricultural Irrigation Pumps



Agricultural Irrigation Pumps (ROG & NO_x)

- **Growth**
  - Based on farming sector economic output projections adjusted by diesel/distillate fuel use projections (the primary fuel type used by agricultural irrigation pumps)
- **Control**
  - we need an accepted method for including Moyer Program emission reductions
- **Future Improvements**
  - We need a better way of estimating the emissions from this category